

Session 1

Impact of Infectious Disease in Early Life: Rationale for Neonatal Vaccination

EARLY LIFE IMPACT OF INFECTIOUS DISEASES IN DEVELOPING AND INDUSTRIALIZED COUNTRIES

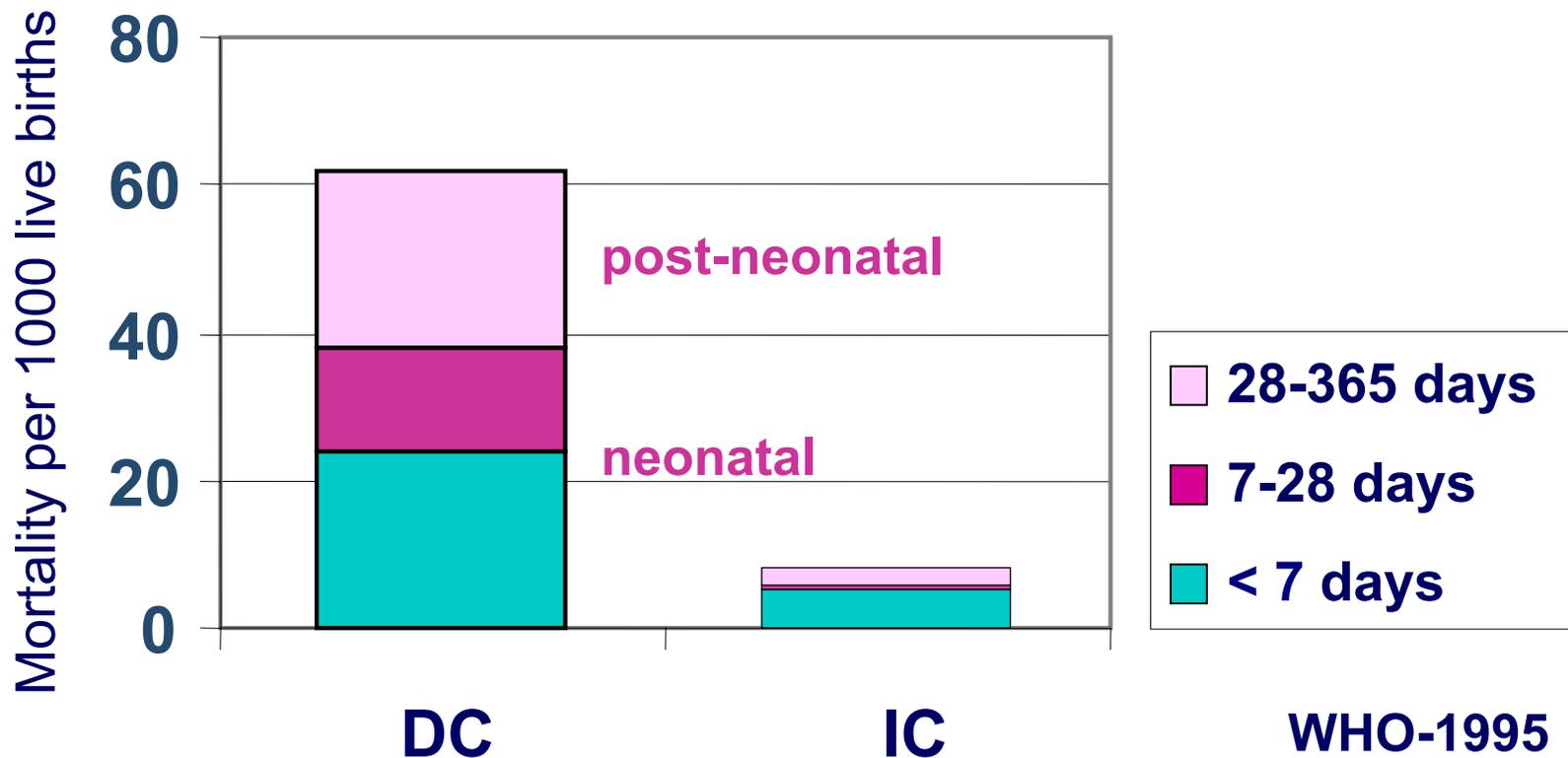


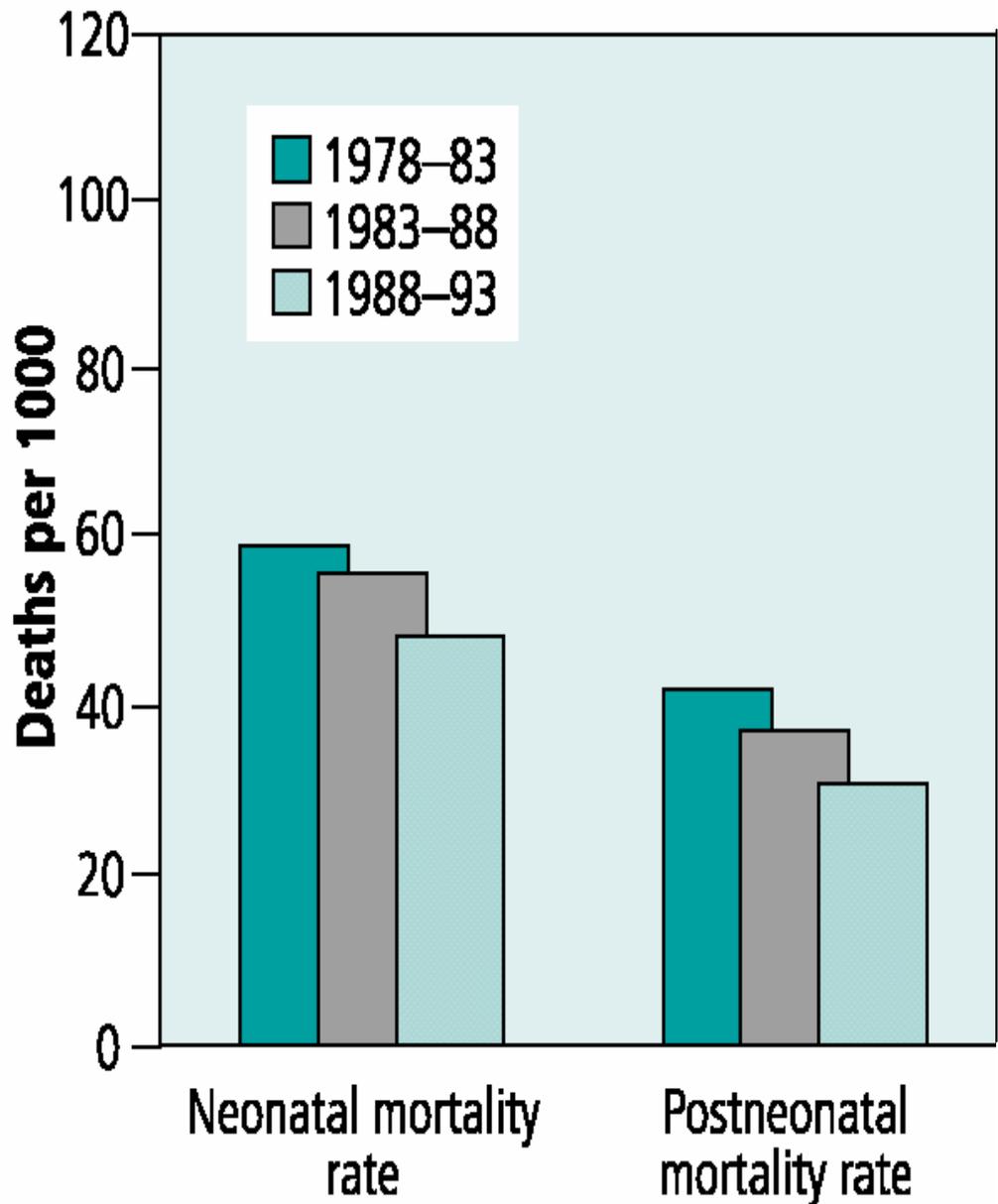
RATIONALE FOR EXPANDED NEONATAL IMMUNIZATION?

Paul-Henri LAMBERT

WHO Coll. Center for
Neonatal Vaccinology
Geneva, Switzerland

GLOBAL INFANT MORTALITY

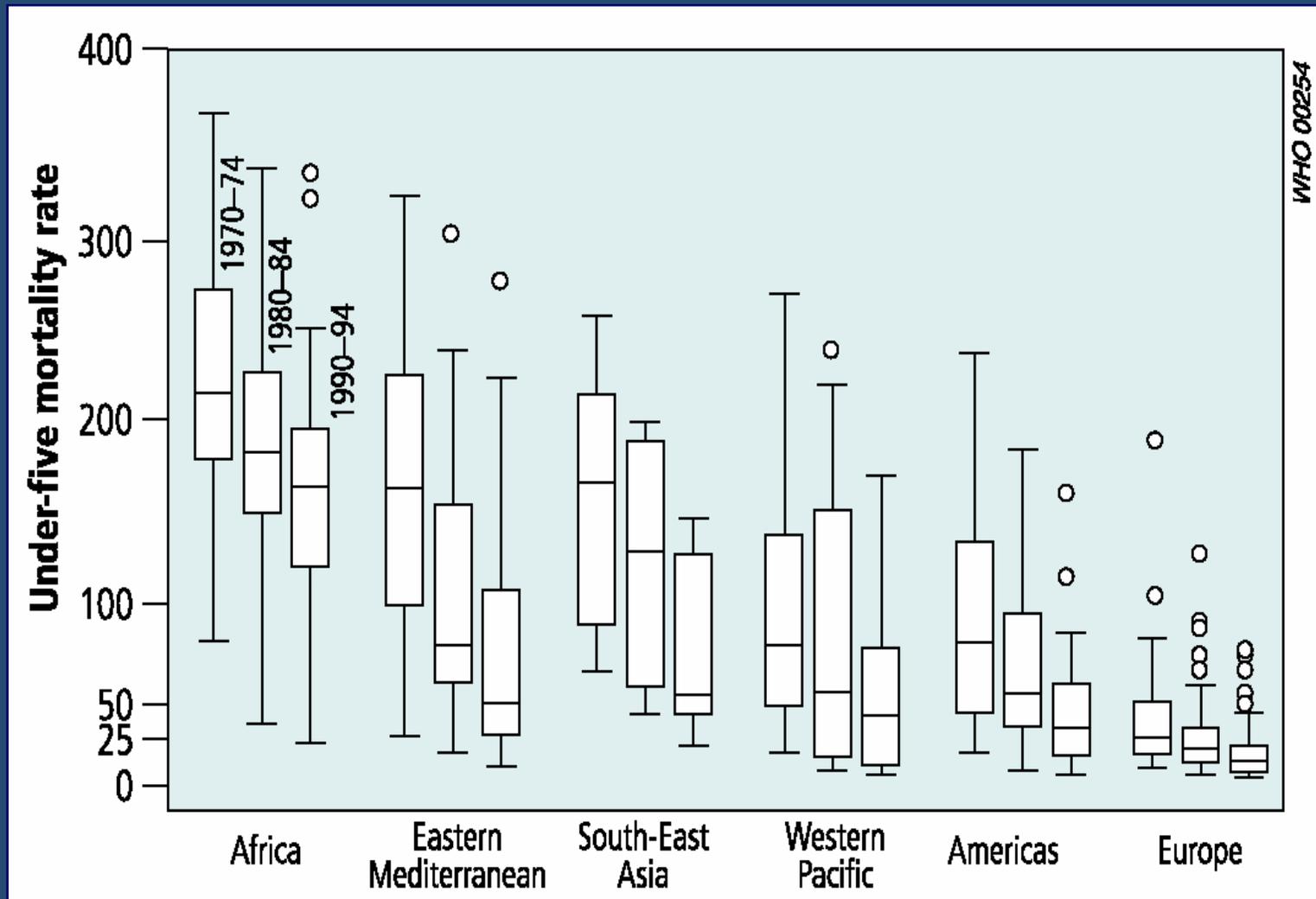




**Trends in
neonatal and
post-neonatal
mortality**

**India
1978-1993**

UNDER-FIVE MORTALITY RATES FROM 1970-74 TO 1990-94



WHO 00254

In the neonatal period,

at global level, infectious diseases still remain **the first cause of mortality**

Annually,

n infection - 1.78 M deaths

n prematurity - 1.15 M

n birth asphyxia/trauma - 1.38 M

n congenital anomalies - 0.52 M

n other perinatal causes - 0.17 M

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n **750,000 pneumonia**

n **300,000 sepsis**

n **50,000 meningitis**

n **150,000 diarrhoea**

n **350,000 n-tetanus**

In the neonatal period,

at global level, infectious diseases still remain **the first cause of mortality**

Main etiologies:

n **S. pneumoniae**
n **Group A Strep.**
n **Staph. Aureus**

n **Coliforms,**
salmonella

n **750,000 pneumonia**
n **300,000 sepsis**
n **50,000 meningitis**

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Neonatal infections: predominant pathogens in industrialized countries

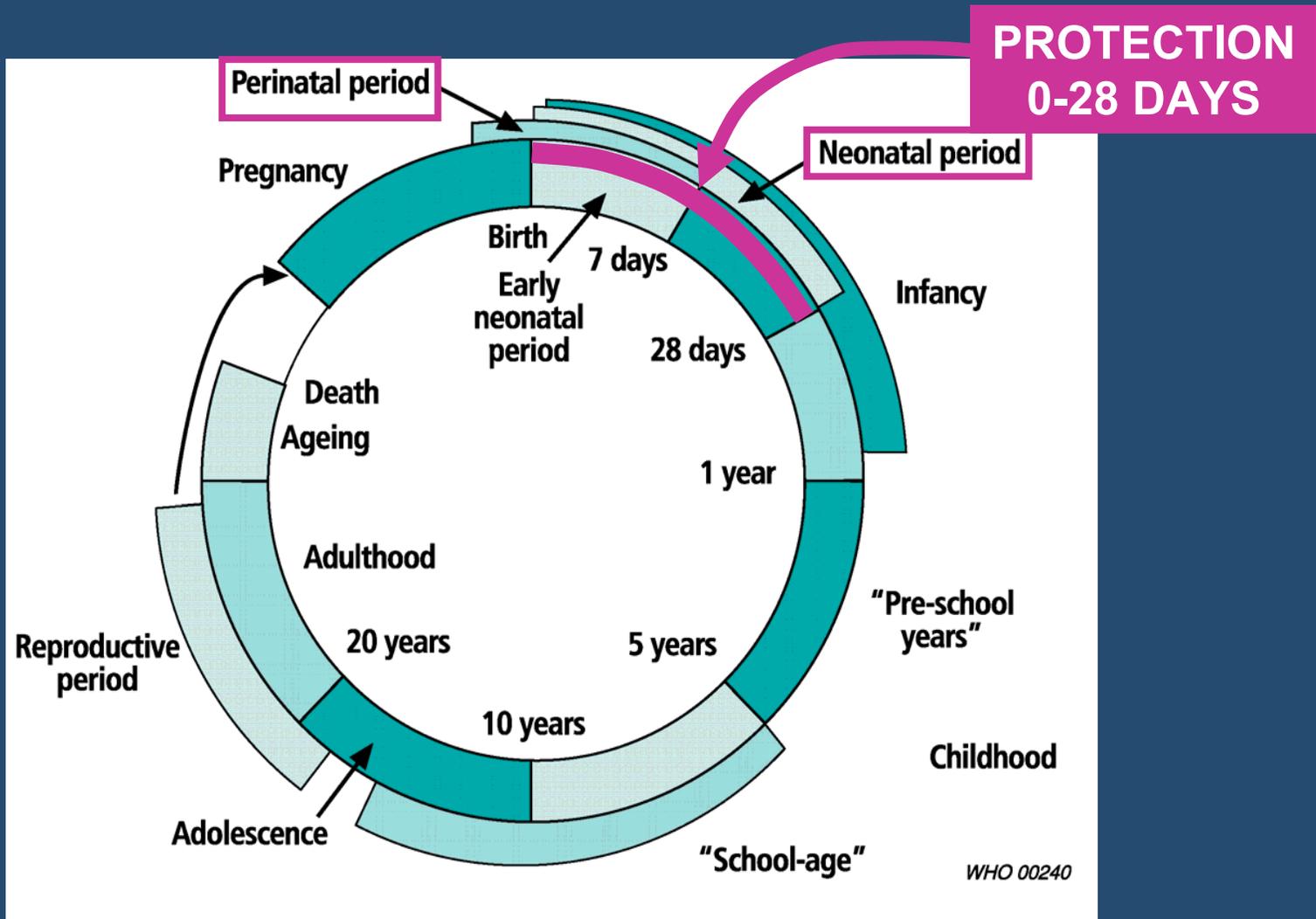
n1930s and 40s: Grp A Streptococcus

n1950s: S. aureus & Gram neg coliforms

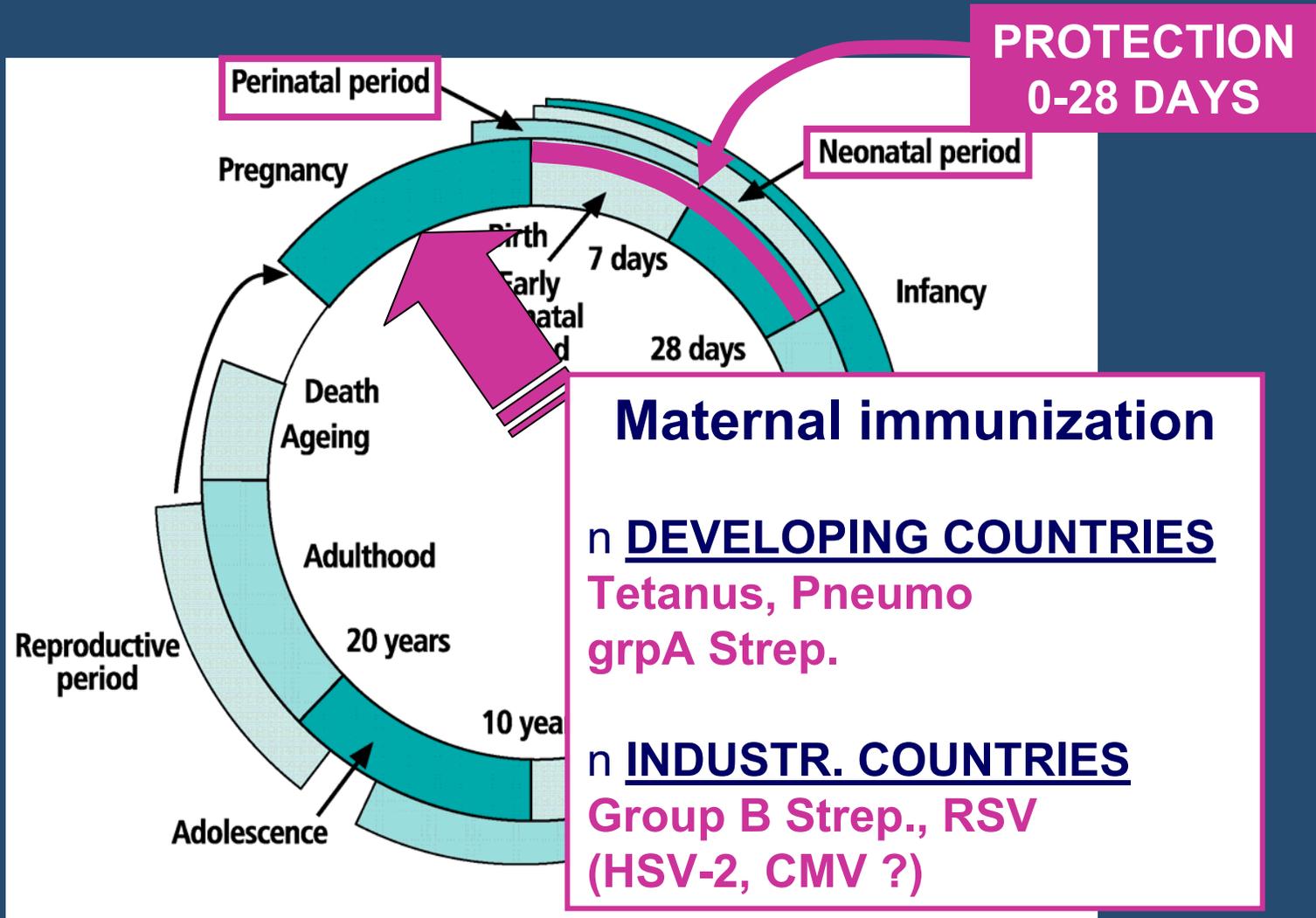
nlate 1950s-90s: Grp B Streptococcus
(2-5/1000), CMV

nlate 1960s-1980s: emergence of HSV-2,
(HSV-1)

ROLE OF VACCINATION FOR SEVERE INFECTIOUS DISEASES IN NEONATES?



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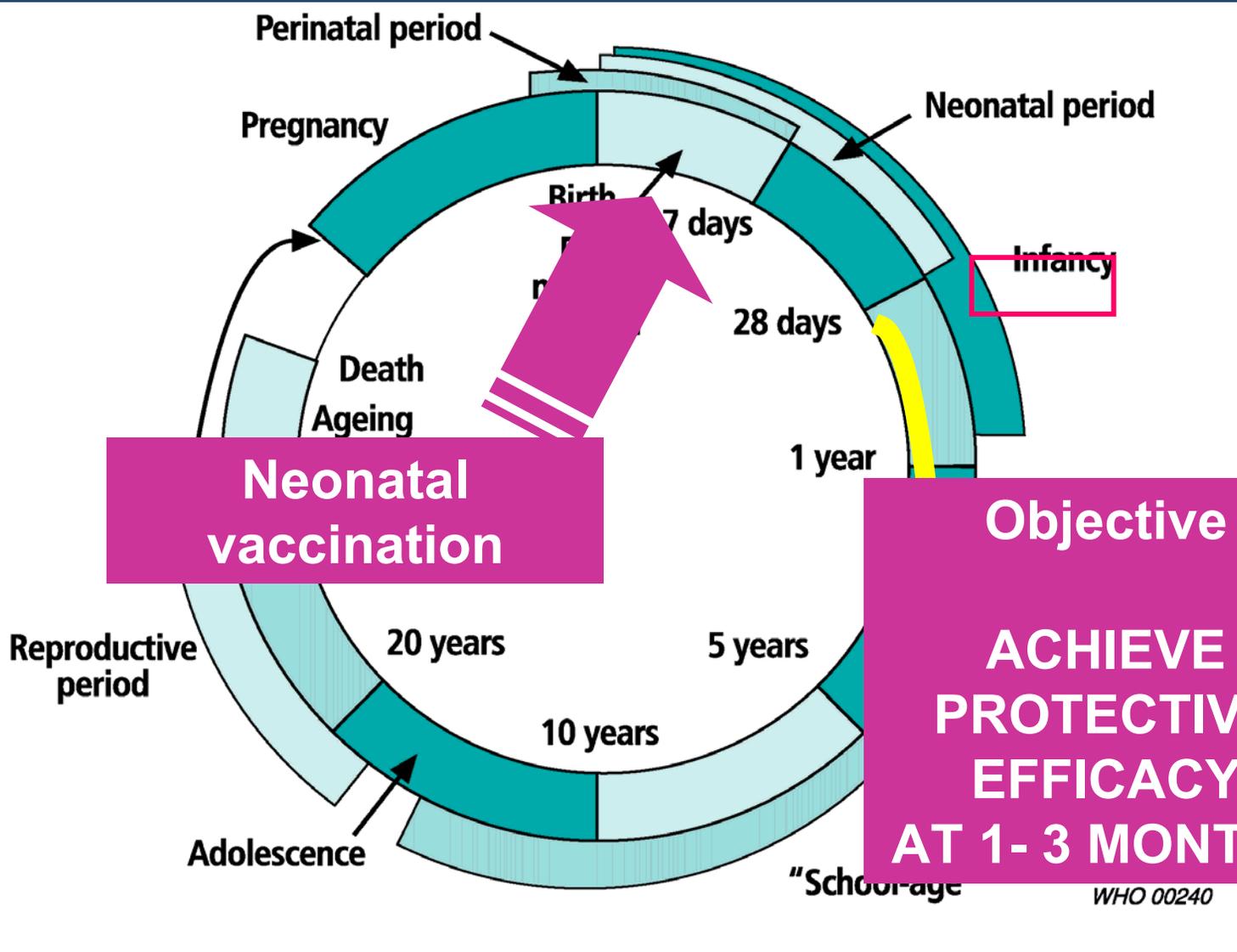
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- **2.5 million infants die of infection**
- **most often before 6 months of age**

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**ROLE FOR NEONATAL
VACCINATION ?**



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Main targets for vaccination

- 1. ACUTE
RESPIRATORY INFECTIONS**

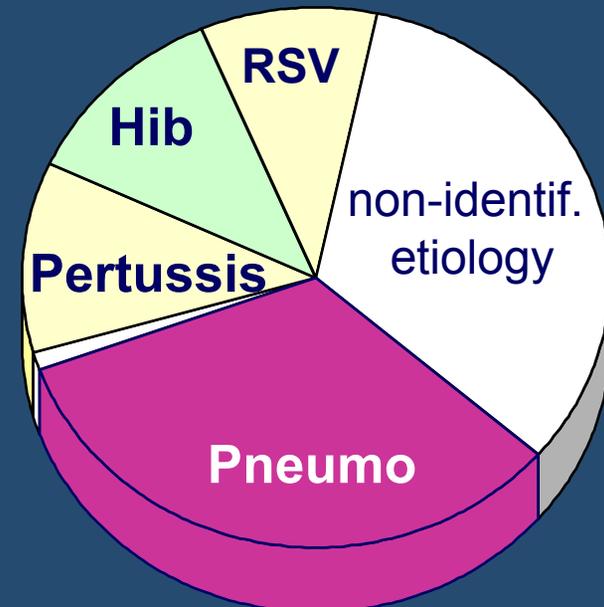
SEVERE ACUTE RESPIRATORY INFECTIONS @ 1- 6 MONTHS

DEVELOPING COUNTRIES

n Pneumo, Hib,
Pertussis

n RSV

ARI
annual mortality <5yrs



Pneumoccal diseases
1,200,000

SEVERE ACUTE RESPIRATORY INFECTIONS @ 1- 6 MONTHS

DEVELOPING COUNTRIES

n Pneumo, Hib,
Pertussis

n RSV

INDUSTRIALIZED COUNTRIES

n RSV, Para-flu
Influenza

n Pertussis

PNEUMOCOCCAL DISEASES IN INFANCY: DIFFERENT PATTERNS

FINLAND

1985-1989

Annual incidence

<2yr:

45 per 100,000

Mainly

bacteremia

THE GAMBIA

1993-1995

Annual incidence

<11mo

200-400 / 100,000

Mainly

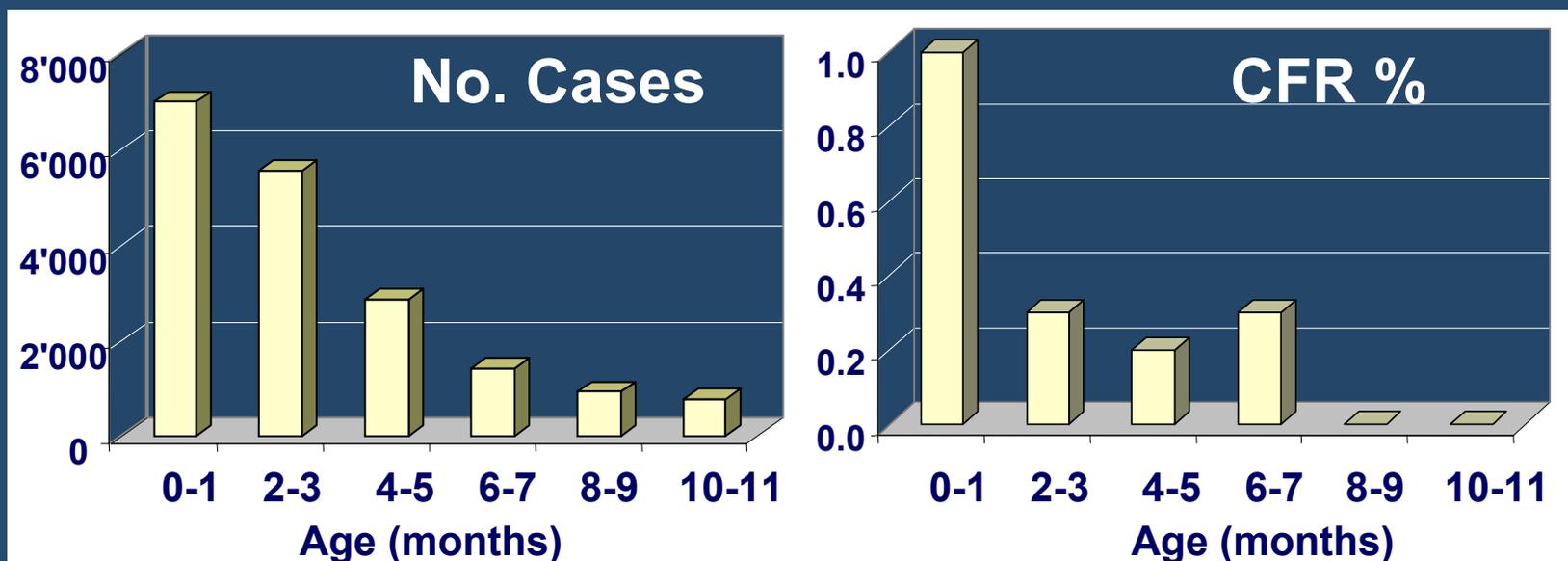
pneumonia

PERTUSSIS - GLOBAL BURDEN

- 48.5 million cases
- 9.4 million < 1 year)
- 295,000 deaths
- most deaths < 6 months

Crowcroft NS, Stein C, Duclos P, Birmingham M,
Lancet Infect Dis. 2003; 3:413-8

Pertussis 1990-1999 USA



From M. Tanaka, et al., JAMA. 2003;290:2968-2975

PEDIATRIC BURDEN OF RSV

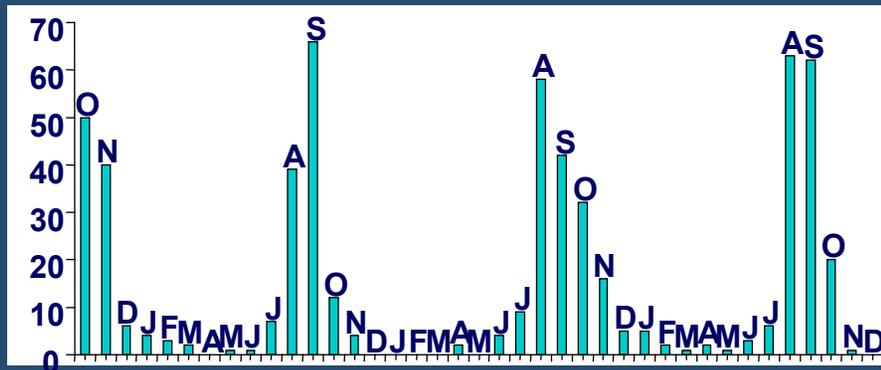
Recent trends among US infants, 1997 to 2000

- Leading cause of infant hospitalization
- RSV accounted for a total of 1.4 million days of in-patient care
- 76% of infants hospitalized for RSV were <6 months of age.
- hospital charges totaled more than \$2.6 billion.

PEDIATRIC BURDEN OF RSV

The Gambia

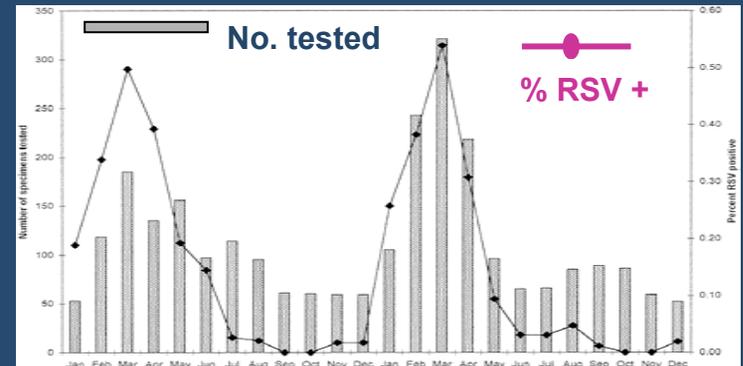
30-50% of hospital ARI in Aug-Sept
mortality 2%



*M. Weber et al, 2002,
WHO Bull., 80:562-568*

rural Indonesia

at end of rainy season,
>50% of hospital. ARI cases
mortality **>1.7%**



*Djelantik et al., 2003,
Pediatr Infect Dis J, 22: 150-156*

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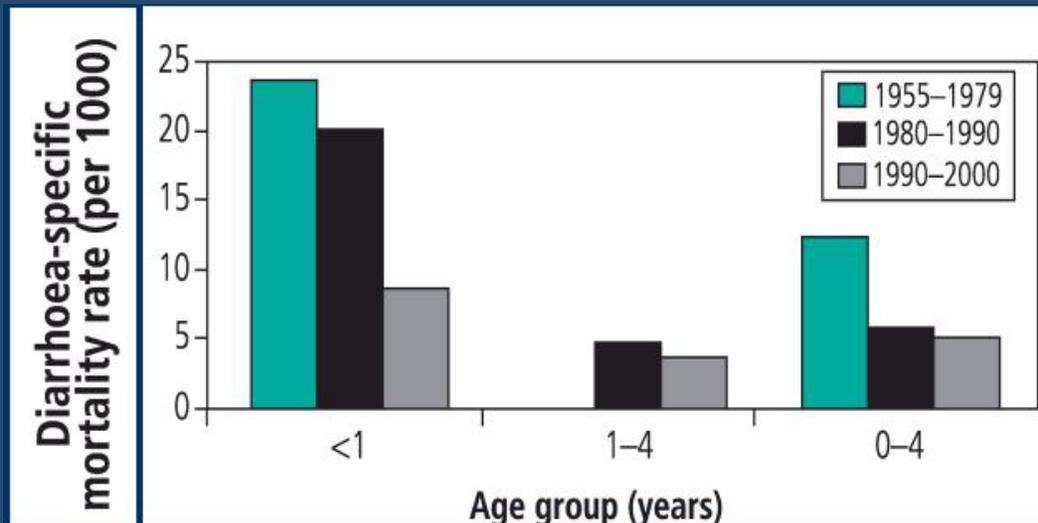
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Main targets for vaccination

**1. ACUTE RESPIRATORY
INFECTIONS**

2. DIARRHOEAL DISEASES

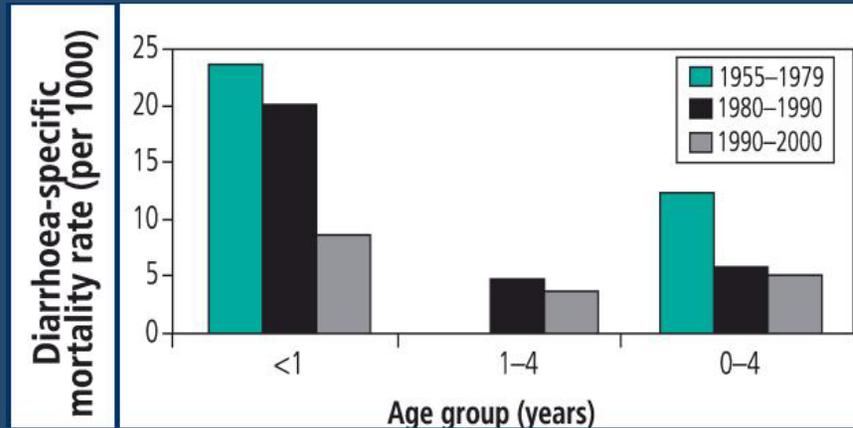
DIARRHOEAL DISEASES



Over the last four decades,

mortality from diarrhoea has fallen substantially

DIARRHOEAL DISEASES

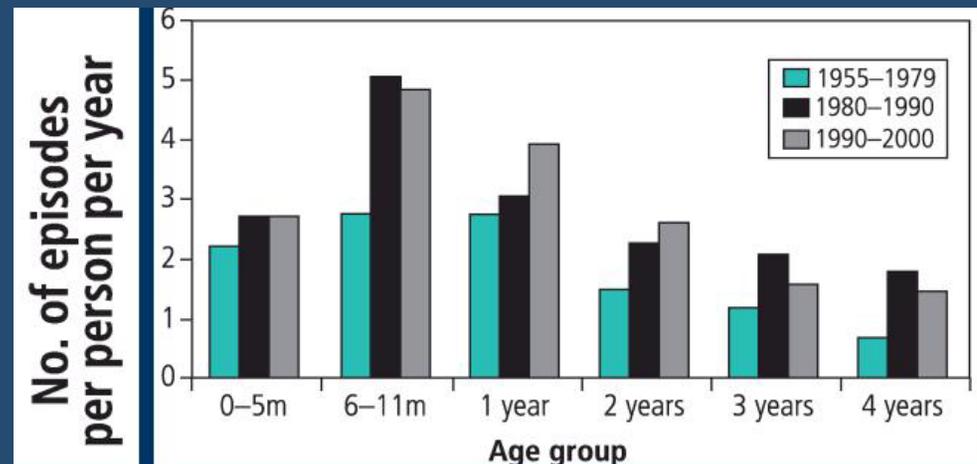


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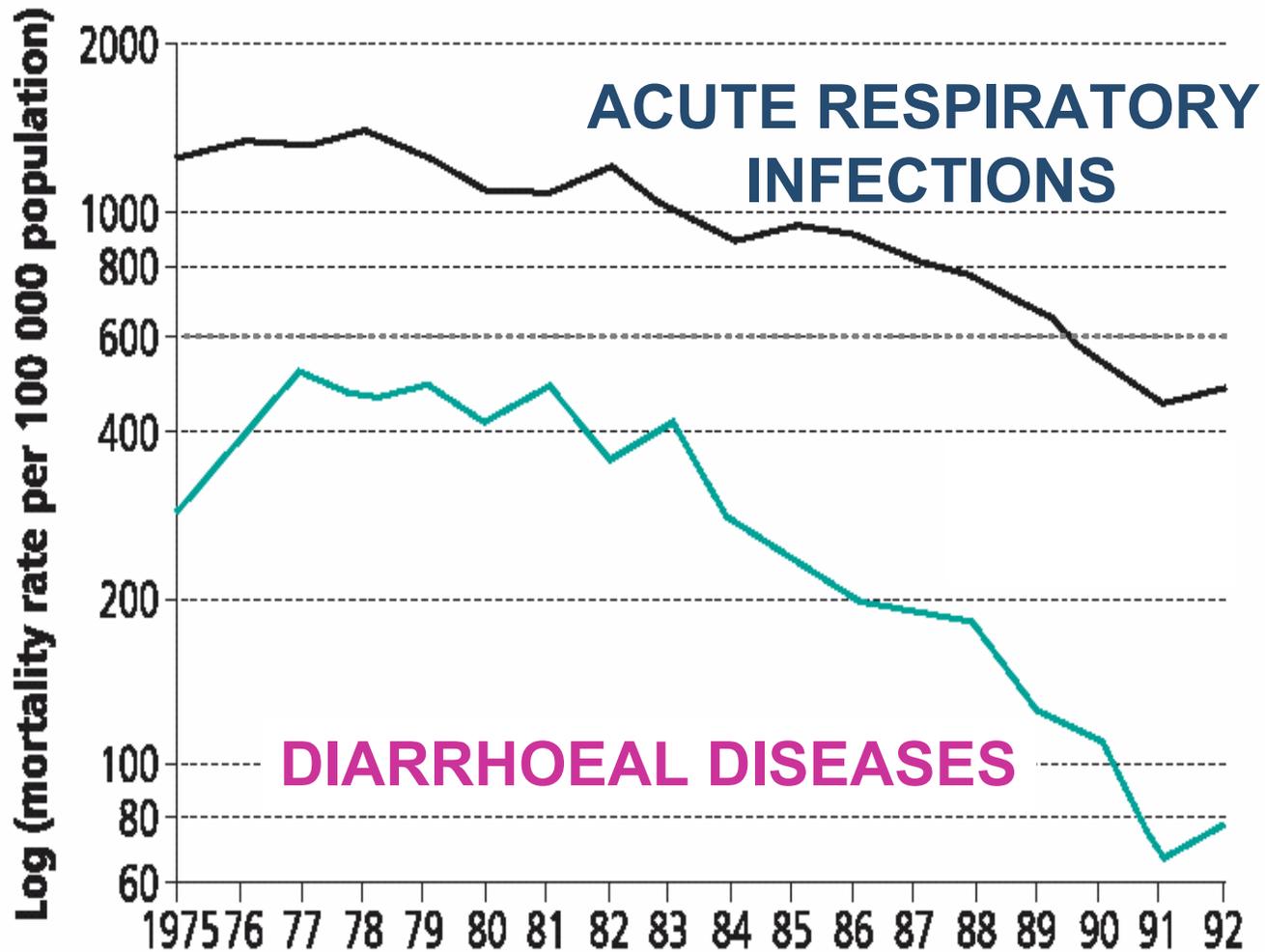
....

but morbidity has remained high!



Kosek M, et al.
Bull World Health Organ,
2003, 81: 197-204

Infant mortality rates— Philippines 1975-92



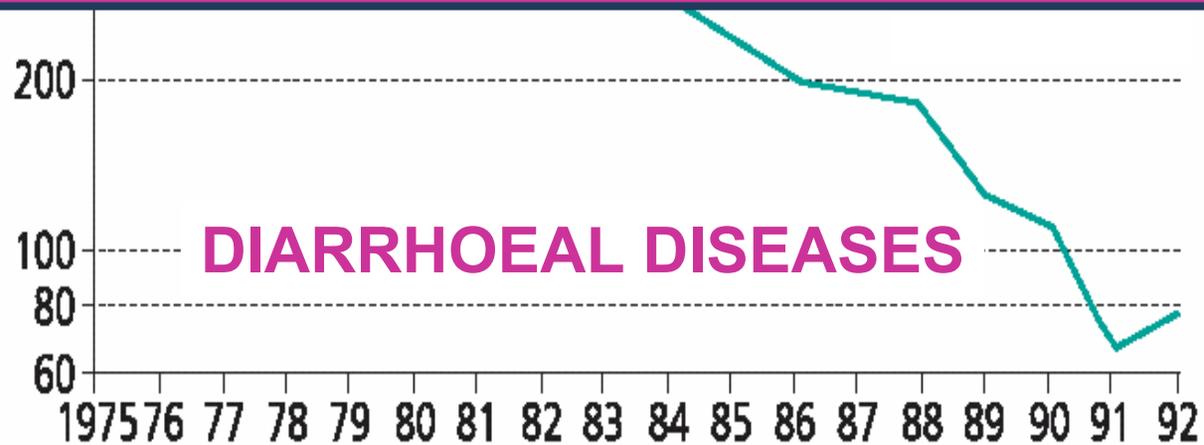
Infant mortality rates

Log (mortality rate per 100 000 population)

At global level

diarrhoeal disease mortality <5 y

- 1980: 4 600 000
- 1992: 3 000 000
- 2000: 2 500 000



**SEVERE
DIARRHOEAL DISEASES
IN POST-NEONATAL PERIOD**

**DEVELOPING
COUNTRIES**

n **Rotavirus**

n **Shigella**

n **E. Coli, Salmon.**

**INDUSTRIALIZED
COUNTRIES**

n **Rotavirus,**

n **E.Coli**

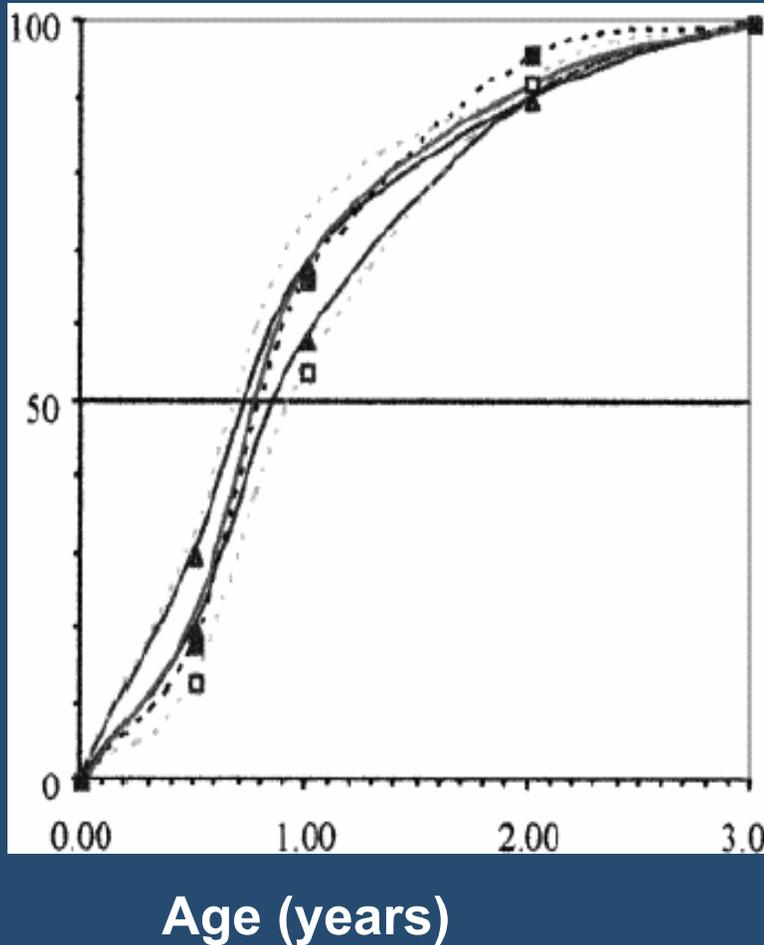
Estimated global prevalence of rotavirus disease



Parashar et al., 2003, Emerging Infectious Diseases 9: 565-572

ROTAVIRUS

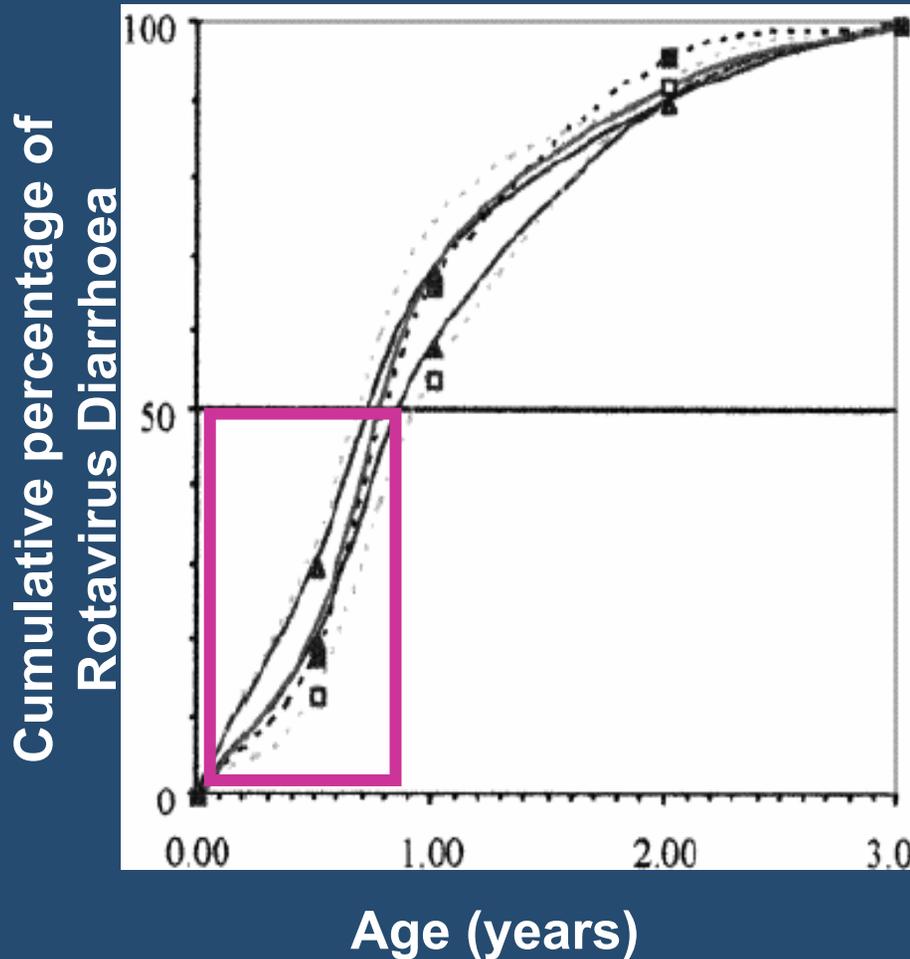
Cumulative percentage of Rotavirus
Diarrhoea



Age of occurrence of
Rotavirus diarrhoea
in Argentina

Bok K et al., J Med Virol.,
2001, 65:190-198

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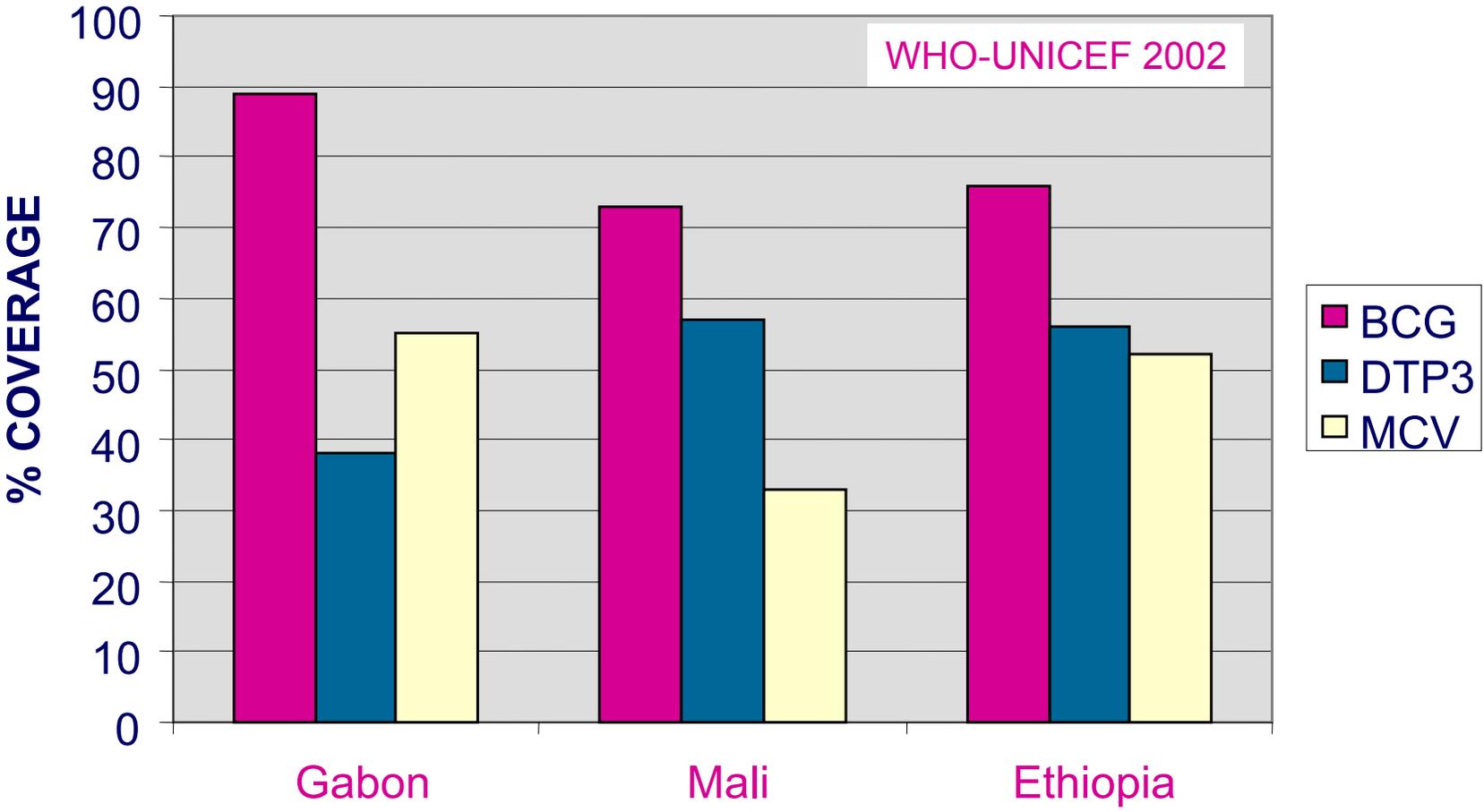
Main targets for vaccination

1. ACUTE RESPIRATORY INFECTIONS
2. DIARRHOEAL DISEASES
3. TB, HIV, Malaria

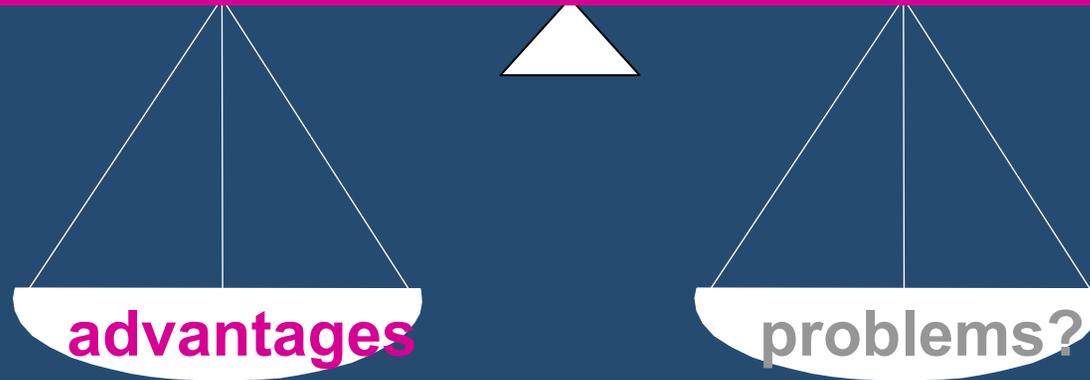
Neonatal vaccination for TB, HIV, Malaria?

- n To achieve preventive efficacy before early exposure
- n To reach a high vaccination coverage (soon after birth)

Higher vaccination coverage soon after at birth



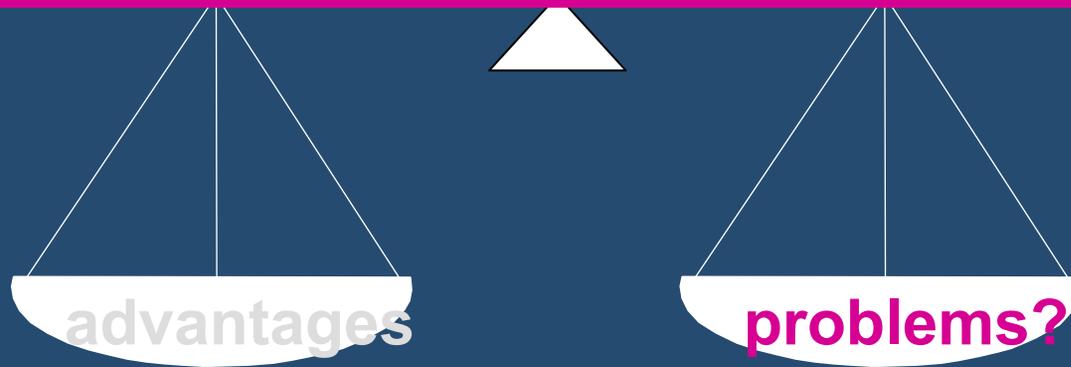
NEONATAL VACCINATION



n PREVENTION OF
DISEASES THAT
OCCUR IN **EARLY**
INFANCY

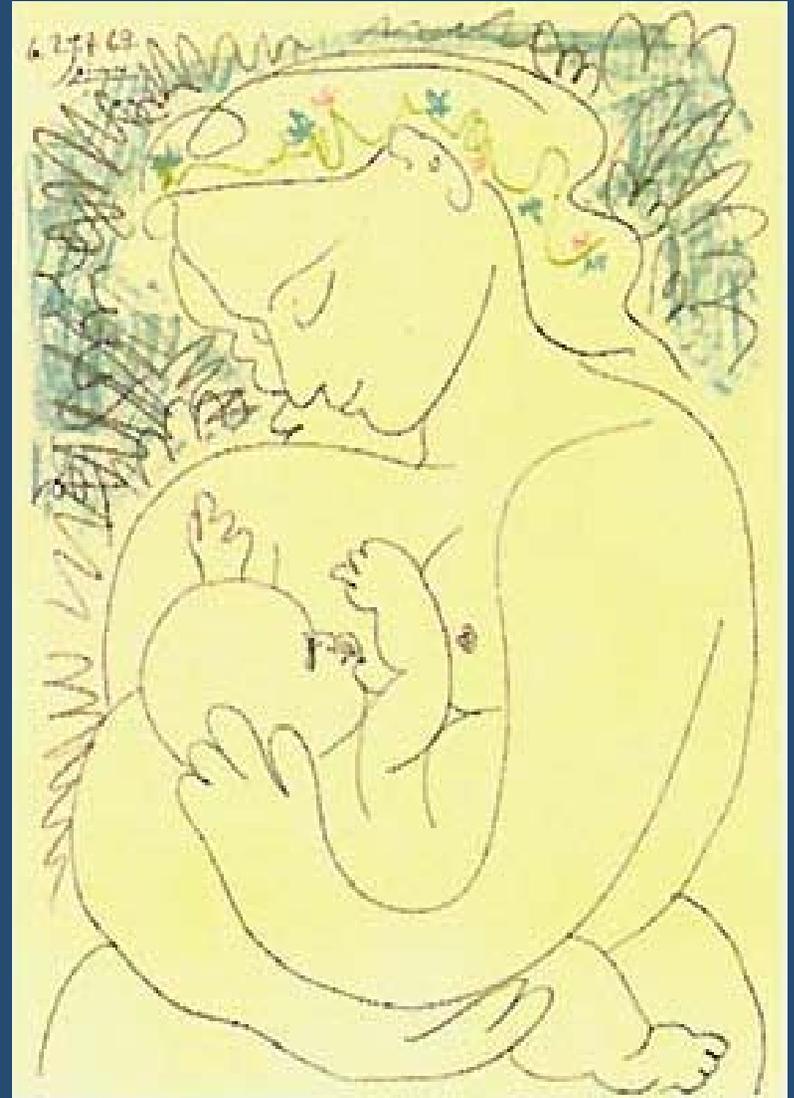
n BETTER
VACCINATION
COVERAGE

NEONATAL VACCINATION



- **QUALITY OF IMMUNE RESPONSE**
- **DURATION OF PROTECTION**
- **EFFECTS OF MATERNAL ANTIBODIES**
- **SAFETY**

**FEASIBILITY
OF NEONATAL
VACCINATION?**



FEASIBILITY

?

- **Millions of neonates have received BCG, Polio, and HepB vaccines**

